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ABSTRACT

Nonverbal communication, which includes proxemics, or the study of an individual's use of space, plays a major role in communication relationships. Culture, gender, and status can all influence one's use of personal space. This study was designed to investigate the physiological effects (heart rate and galvanic skin response) of the invasion of a student's personal space contingent upon the sex of an authority figure (male or female university professor). Twelve male and 12 female undergraduates halted an approaching professor at what was felt to be a distance suitable for a comfortable conversation. The professor then advanced to an invasion distance of 9 inches. Subjects' physiological data were analyzed at both conversation and invasion distances, using t-tests and two-way analyses of variance. The results revealed that student-controlled stop-distances fell within the categories of intimate (contact to 18 inches), casual/personal (18 inches to 4 feet), and social/consultative (4 to 12 feet). Means showed that on an average, professors were permitted within the casual/personal area, with the female mean distance being slightly closer than the male mean. The results also indicated that the sex of the professor did not have a significant effect on the physiological responses of the students. This finding may reflect a change in attitudes toward women and gains in female status. (Author/NB)

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Effects of Invasion of Students' Personal Space by Male and Female Authority Figures

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Abstract

This study was designed to investigate the physiological effects (heart rate and GSR) of the invasion of students' personal space contingent upon the sex of an authority figure (university professor). Twelve male and twelve female undergraduates halted an approaching professor at a comfortable conversation distance. The professor then advanced to an invasion distance of nine inches. Subjects' physiological data were gathered at conversation and invasion distances. Data were analyzed using t-tests and two-way analyses of variance. A .05 level of significance was set for the evaluation of the statistics. Results indicate that the sex of the professor did not have a significant effect on the physiological responses of the students.

Effects of Invasion of Students' Personal Space by Male and Female Authority Figures

Nonverbal communication plays a major role in communication relationships. Feelings and reactions are expressed through body language, providing a context for our words. Nonverbal communication includes proxemics, the study of man's use of space (Hall, 1966). According to Hall, "the flow and shift of distance" between interactors "is part and parcel of the communication process" (1959, p. 160). Hall (1959) notes that "spatial changes give a tone to a communication, accent it, and at times even override the spoken word" (p. 160).

Proxemics is also known as "personal space," that "invisible 'bubble' we seem to carry around with us and claim as our own" (Emmert & Donaghy, 1981, p. 184). For Little (1965), personal space is "the area immediately surrounding the individual in which the majority of his interactions with others take place" (p. 237). Personal space is the space an individual sets between himself and others. The invisible boundaries of the area may become apparent only when they are crossed (Rosenfeld, 1973).

Personal boundaries are highly variable and are influenced by a number of factors, including culture. Americans

typically prefer to stand at a distance where they can see and hear well without engaging the other senses. People from other cultures prefer to stand at distances where touch and smell may also be used (Hall, 1974). Proxemic behavior is apparently learned early in life. Studies show that very young animals learn how far to stay from other species members. If deprived of contact with their own kind, problems in social intercourse result from the failure to learn proper spacing. Coming too close evokes threat displays; staying too far away inhibits group membership (Klopfer and Hailman, 1967). DeVito (1978) feels that children learn proxemics without any conscious or direct teaching by the adult community. Exposure to spatial relationships is internalized unconsciously, just as children acquire other codes of speech and body motion. According to Hall (1966), "Man's feeling about being properly oriented in space runs deep. Such knowledge is ultimately linked to survival and sanity. To be disoriented in space is to be psychotic" (p. 105).

Sex or gender also influences personal space. Eakins and Eakins (1978) consider sex to be a primary indexing factor in human thought and interaction. In our society, the male is usually seen as dominant. Traditionally, the male initiates activity, is usually deferred to, puts his interests first, and acts directly to further them. In general, females

will sit or stand closer to each other than to males, while males will sit or stand closer to females than to other males (Burgoon, 1974). Gender stereotyping of male dominance affects our reactions and evaluations in unexpected ways. It affects the way listeners receive information. When an identical lecture was delivered to two groups of students by a male and a female, students accepted the male-delivered lecture as more authoritative and credible than the female-delivered lecture (Bernard, 1964). In a similar study, Goldberg (1972) presented identical sociology papers to groups of female college students. When the readers thought the author was a woman, criticisms centered on careless data and unsound arguments. A less than positive professional future was predicted for the author. When the readers thought the author was a man, the paper was viewed in a more positive light, with rosier prospects for the male author's future. These studies demonstrate that gender affects the ways we are perceived by others of the same or the opposite sex.

Status also influences our personal space. Respectfully, we tend to stand farther away from higher-status persons (Bykers & Anderson, 1975). Students tend to sit toward the back of a classroom or avoid sitting next to the instructor when chairs are arranged in a circle. Status relationships, dominance-submission patterns, and superior-subor-

dinate relationships are asymmetrical patterns characterized by inequality, nonmutuality, and asymmetrical behavior. One has a privilege that the other does not (Eakins & Eakins, 1978). Higher status personnel may freely invade the territory of those with lower status (Goldhaber, 1983). In a study by Hutte and Cohen (cited by Burns, 1964), ten one-minute films were shown to audiences. The two actors in the films randomly switched roles in which one actor sat at an office desk and the other knocks at the office door, enters, and approaches the man at the desk. Audiences were very consistent in rating the relative status of the two men, rating the caller as most subordinate when he stopped just inside the door and conversed at that distance, somewhat less subordinate when he walked halfway into the room and conversed, and least subordinate when he walked directly to the desk and conversed. Dean et al. (1975) observed the beginning of two-person conversations of 562 active-duty U.S. sailors ranging in rank from captain to seaman. Interactions directed toward superiors were characterized by greater interpersonal distance which increased as rank differences increased. This relationship did not occur when interactions were initiated by a person of higher rank. Superiors apparently have the option of formality or informality and are free to vary distances with subordinates.

Hall (1966) developed four categories of personal space which interact with influencing factors. Intimate distance ranges from physical contact to 18 inches. Close friends are admitted to this space. Casual/personal distance ranges from 18 inches to four feet. Social/consultative distance, the space at which we conduct personal business, ranges from four to 12 feet. Public distance begins at 12 feet and ranges to infinity. The specific distance chosen at a given time depends upon the nature of the transaction, the relationship of interactors, how they feel, and what they are doing. Hall (1966) notes the importance of how interactors feel as a decisive distance determinant. Angry, emphatic people move in close and "turn up the volume" by shouting. The more people like each other, however, the closer they sit or stand (Mehrabian, 1968).

Verderber & Verderber (1980) discuss personal or informal space in the context of territory (a space over which a person claims ownership). Violations of this space cause defensive reactions. Williams (1963) conducted one of the first studies on the invasion of personal space. Williams used students classified by a personality test as introverts or extroverts. As he approached them, students were told to speak out as soon as he came too close. He also reversed the condition, moving from very close to comfortable conversation

distance. Results showed that introverts kept people at greater conversational distance than extroverts. McBride et al. (1965) used the galvanic skin response (GSR) as an index of emotionality in their study of human spatial behavior. Seated college students were approached by male and female experimenters, paper figures, and other non-human objects. GSR readings were highest for students approached frontally; side approaches yielded a greater response than a rear approach. Reactions were stronger to opposite-sex approaches than to same-sex approaches. Being touched by an object produced lower GSR readings than being touched by a person. Additional evidence of the strong sense of discomfort produced by spatial invasion was provided by Hayduck (1981).

The current study was designed and conducted in order to gain greater insight into human reactions and behavior in interpersonal relationships. Based on the review of the literature, the hypothesis is that students of both sexes will react more significantly to the invasion of their personal space by a female professor than by a male professor.

Method

Subjects. Subjects for this study were twenty-four randomly selected undergraduates at The Pennsylvania State University, New Kensington Campus. All subjects were volunteers who were approached by the experimenter prior to the study. Twelve subjects were male and twelve were female. Enrollment

in classes taught by either participating professor served as the rejection criterion for subject participation in this study.

Apparatus. A Lafayette Instrument Co. Heart Rate Monitor, Model 77065, was used to record subjects' heart rate data. A Lafayette Instrument Co. portable GSR unit, Model 76767, was used to record subjects' galvanic skin response (GSR) data. Connection to both units was by finger contacts.

Procedure. The experiment began with the connection of each subject to the heart rate monitor and the GSR unit by the use of finger contacts. Each subject was placed at a designated line taped to the floor. They were then told that they would be approached by another person. When that person reached what the subject felt was a comfortable conversation distance, they were to say, "Stop." Subjects were told that the stop-distance could then be modified by the approaching person. Subjects were also told that they would be approached twice, with a few minutes rest between approaches. Prior to the introduction of the first experimental approach, each subject's heart rate was recorded, and the GSR was adjusted to zero. The subject was then approached by one of the two selected professors (both PhDs). The experiment was designed using counterbalancing; 50% of the time the male professor approached first and 50% of the time the female professor approached first. An approach consisted of a sub-

ject-controlled stop point and a predetermined (by the experimenter) invasion point (9"). Each subject received two approaches (one by the male professor, one by the female professor). The professor walked toward the subject until the subject felt that the professor was within comfortable conversation distance, at which time the subject told the professor to stop ("stop"). This distance was measured and the heart rate and GSR were recorded. The professor then moved to an experimenter predetermined distance of nine inches from the subject ("invasion"). Again, the heart rate and GSR were recorded. This procedure was then repeated with the other professor making the approach.

Results

Statistical analyses for this study included t-tests and two-way analyses of variance. Significance was considered to be at the .05 level or less.

Insert Table 1 about here

Table 1 shows the subject-controlled stop distance (comfortable conversation distance) for the first and second approaches. On the first approach, professors were halted anywhere from 11.50 to 68.50 inches. Overall, the professors were stopped at an average distance of 27.78 inches. Males stopped the professors at an average of 30.63 inches. Males'

stop-distances range from 13.00 to 68.50 inches. The first-approach average for females was 24.94 inches, with a range from 11.50 to 50.00 inches.

Subjects directed the professors to stop the second approach at an average of 21.35 inches (total sample mean). The distance for the total sample ranged from 9.00 to 36.00 inches. The male mean (21.40 inches) for the second approach was much closer to the female mean (21.31 inches) than in the first approach. Males' stop-distances ranged from 9.00 to 36.00 inches compared to a female range of 9.00 to 35.50 inches. When comfortable conversation (stop distance) means were compared for males and females using t-tests, no significant differences were found for either approach.

Insert Table 2 about here

Heart rate and GSR readings for male and female subjects show interesting differences. The significance of these differences is reported in Table 2. For males, differences between base heart rate, stop-distance heart rate for both approaches, and heart rate at the first approach invasion (when the professor moved to a distance of nine inches from the subject) were all significant ($p < .05$). No significant differences were found between stop-distance heart rate and invasion heart rate for males in either of the two approaches,

however. For females, the difference between base heart rate and stop-distance heart rate in the first approach was significant at $p < .05$. No other heart rate differences were significant for females (see Table 2). Results of t-tests performed for male and female GSR readings showed no significant differences between stop and invasion readings for either approach for either group (see Table 2).

Two-way analyses of variance were performed on stop-distance heart rate, invasion distance heart rate, stop-distance GSR, and invasion distance GSR. Rows represented male-female students, while columns represented male-female professor. A significant difference ($p < .05$) was found between male and female students for stop heart rate only ($F=8.77$). No other differences or interactions were significant in any of the four ANOVAs.

Based on the statistical analyses of the data, the hypothesis for this study must be rejected. Students did not react more significantly to the invasion of their personal space by the female professor than by the male professor as had been predicted.

Discussion

Statistical results indicate that the sex of the professor produced no significant differences in students' physiological reactions to the invasion of their personal space.

This study, therefore, does not support research by Bernard (1964) and Goldberg (1972) indicating that students regarded male professors as more authoritative and credible than female professors. This contradiction may reflect a change in attitudes toward women. Gains in female status, particularly in professional settings, may have contributed to status equality between the two professors. Within college-age samples in academic settings, female professors may now be perceived to be as credible and knowledgeable as male professors.

Student-controlled stop-distances reported in this study are consistent with Hall's categories of personal space (1966). Ranges fell within the categories of intimate (contact to 18 inches), casual/personal (18 inches to four feet), and social/consultative (four to twelve feet). Means show that on an average, professors were permitted within the casual/personal area. The male mean for the first approach was 30.62 inches; the female mean was 24.94 inches. The difference was expected, since females are traditionally perceived as allowing closeness and males tend to hold others "at a distance." On the second approach, the male mean was 21.40 inches and the female mean was 21.31 inches. Mean distances were expected to decline on the second approach because subjects knew what to expect.

Only seven subjects (three males and four females) permitted professors to enter the intimate area on the first approach. The same seven subjects also permitted entry to the intimate area on the second approach. One additional male subject permitted entry to intimate space on the second but not the first approach. The expected decline in means did not affect entry into intimate space, which was denied to the professors by the majority of students.

Consideration should be given to observations of student behavior during the experiment. A direct approach may in itself by threatening even though students controlled the stop-distances. A direct approach by an authority figure may be even more threatening. One female subject expressed such feelings. When approached by the female professor, she said, "You're going to yell at me now, aren't you?" When approached by the male professor, she asked, "You're not going to hurt me, are you?" Females may have relaxed more than males after experiencing approach 1. Males' heart rates were significantly higher than the base rate for both stop-approaches and the first invasion. Females' heart rates were significantly higher only on the first stop-approach.

While there was only one statistically significant physiological difference (heart rate) for the invasion distance of nine inches (Table 2), reaction to that invasion was

observed. Many subjects turned their bodies at an angle to the professor or averted their eyes. This supports the study done by Williams (1963). Some became verbal, telling the professors to stop as they entered the subject's intimate personal space. One female subject asked the male professor, "What did you do that for?" when he moved to the nine inch invasion distance. One factor influencing the lack of significance on the invasion distance may stem from the fact that the subjects had been told at the beginning that there may be a modification in distance after the professor was told to stop. Another study without that part of the instructions would indicate if this was a factor. Another reason could be that the subjects perceive that professors have the right to move within their intimate personal space by virtue of being authority figures.

The hypothesis for this study was not accepted. Given the change in society's attitudes toward the equality of males and females in recent years, this study could be conducted again controlling for age. Would there be a significant difference between young people and older people? This would show whether this study was influenced by the change in attitude toward women. If this were true, it would put previous studies and current conclusions into question, opening the way for extensive new research and study.

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Table 1

Subject-controlled Conversational Stop-distances [1]

	Males (n=12)		Females (n=12)	
	Approach 1	Approach 2	Approach 1	Approach 2
1	23.50	19.50	34.00	29.00
2	68.50	26.25	18.00	15.50
3	36.00	23.00	28.50	30.00
4	35.00	26.00	11.50	9.00
5	18.00	16.50	27.50	24.00
6	28.00	30.25	16.50	14.50
7	23.00	9.25	13.00	9.00
8	18.00	10.50	30.00	19.50
9	43.00	36.00	18.25	18.25
10	13.00	9.00	50.00	36.50
11	38.00	28.50	28.00	31.00
12	23.50	22.00	24.00	19.50
Mean	30.62	21.40	24.94	21.31

Total Sample Means (n=24) = 27.78 inches - Approach 1

21.35 inches - Approach 2

[1]Distance is in inches.

Table 2

Significance of Male and Female Heart Rate and GSR Differences as Determined by t-tests

	Heart Rate t-scores			
	Stop 1	Stop 2	Invasion 1	Invasion 2
Male				
Base	2.90*	2.41*	2.92*	2.06*
Stop 1			.48	
Stop 2				0.00
Female				
Base	2.21*	.92	.49	.94
Stop 1			1.80	
Stop 2				.18
	GSR			
Male				
Stop 1			1.21	
Stop 2				1.06
Female				
Stop 1			.12	
Stop 2				.10

*p= .05